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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/363,523	07/29/99	JAMMY	R 99-P-7722-US

SIEMENS CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
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ISELIN NJ 08830

MMC2/1012

EXAMINER

ESTRADA, M

ART UNIT

PAPER NUMBER

2823

DATE MAILED:

10/12/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/363,523

Applicant(s)

JAMMY ET AL.

Examiner

Michelle Estrada

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) ____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 20) ☐ Other: ____.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-8 and 10-16 drawn to method for forming a crystalline silicon nitride layer, classified in Class 438, subclass 1+.
- II. Claims 9, 17 and 18-20 drawn to a trench capacitor, classified in Class 257, subclass 301.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (M.P.E.P. 806.05(f)). In the instant case unpatentability of the group I invention would not be necessarily imply unpatentability of the method of the group II invention, since the device of the group II invention could be made by process different from those of the group I invention. For example, the crystalline silicon nitride layer can be formed by chemical vapor deposition and using amorphous silicon in structure.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Donald B. Paschburg (Reg. No. 33,753) on September 8, 2000, a provisional election was made without traverse to prosecute the invention of a method for forming a crystalline silicon nitride layer, claims 1-8 and 10-16. Affirmation of this election must be made by applicant in replying to this office action. Claims 9, 17 and 18-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(B), as being drawn to a non-elected invention.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Applicant is reminded that upon cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(I).

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Figure 5 element 22. Correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thakur et al. in combination with Schachameyer et al.

Thakur et al. disclose providing an atomically clean crystalline silicon substrate with an exposed surface (Column 4, lines 15-16), exposing the exposed surface to nitrogen to form a silicon nitride layer (Column 5, lines 20-22) including the step of introducing ammonia at 850-1150 °C, depositing an amorphous silicon nitride layer over the crystalline silicon nitride layer (Column 5, line 25), and oxidizing the amorphous silicon nitride layer to form a node dielectric layer (Column 5, line 45).

Thakur et al. do not disclose providing the atomically clean surface by precleaning the exposed surface by employing a hydrogen prebake.

Schachameyer et al. disclose precleaning an exposed silicon surface by employing a hydrogen prebake at 20 torr and 570 °C to remove native oxide and thus produce an atomically clean surface (Column 2, lines 35-68), it also includes the step of employing a hydrogen fluoride wet clean process to remove native oxide from the exposed surface and delay between employing the hydrogen prebake and employing the hydrogen fluoride. The reference does not disclose duration of delay, but it would have been a matter of routine optimization within the teaching of the references.

It would have been within the scope of one of ordinary skill in the art to employ the precleaning process of Schachameyer et al. for its disclosed intended purpose to obtain the atomically clean surface of Thakur et al.

The process of the combination would result in formation of crystalline silicon nitride because the same materials would be treated in the same manner as in the instant invention.

Choice of particular conditions for the nitridation step would have been a matter of routine optimization within the teachings of Thakur et al.

Claims 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thakur et al. in combination with Schachameyer et al. as applied to claims 1-8 above, and further in view of Wolf, Vol. 2.

The combination of Thakur et al. and Schachameyer et al. does not disclose making the capacitor in a trench.

Wolf discloses making a capacitor in a trench (Wolf, Vol. 2, page 51) and pointed out three major purposes: "(1) to prevent latchup and to isolate n-channel from p-channel devices in a CMOS circuits; (2) to isolate the transistors of bipolar circuits; and (3) to serve as storage-capacitor structures in DRAMs". It would have been within the scope of one of ordinary skill in the art to employ the process of Wolf for its disclosed intended purpose to achieve the capacitor formation step of the combination.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 703-308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431 and 3432) for regular communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



George Fourson
Primary Examiner
Art Unit 2823

MEstrada
October 5, 2000